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ISOTOPE LABEL IMMUNOASSAY (ILIA) FOR ATTOMOLE TO NANOMOLE HAPTEN DETECTION WITH CHEMICALLY EXACT COMPETITORS.

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We developed direct and competitive forms of an isotope-labeled immunoassay (ILIA) that combine the sensitivity from low natural backgrounds of radioisotopes with efficient mass spectrometric detection. Non-hazardous amounts of long-lived isotopes such as ^{14}C can be used to label haptens for long shelf life, invariant standard levels, and no detectable radioactive waste. The assay increases sensitivity to femtomole and attomole levels by directly quantifying the isotopic label with accelerator mass spectrometry (AMS) instead of detecting radioactive decay. AMS measures the isotope label precisely, even at high inhibitions. Data from our assays show that simple kinetics of a single mass-action binding describe the interaction over 4 orders of magnitude of competitor, with the association constant at low concentrations equal to that measured in RIAs at high concentrations. ILIA can be one hundred times more sensitive than other assays using the same antibody.

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